

Docket No. RINO001

PATENT APPLICATION
APPARATUS AND METHOD FOR CLEANING
PAINTBALL GUNS

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Apparatus and Method for Cleaning Paintball Guns

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FIELD OF THE INVENTION

5 [0001] The present invention relates generally to the field of paintball equipment and, more particularly, pertains to cleaning devices used in removing from the barrel of a paintball gun residual paint deposits left from previously ruptured paintballs.

BACKGROUND OF THE INVENTION

10 [0002] The game of paintball has enjoyed great success in recent years and is a game in which two or more teams try to capture one another's flags. The players on each of the teams each carry a CO₂ powered gun that shoots paintballs that are propelled by short bursts of the pressurized gas. Typically, paintballs are gelatin covered, spherical capsules having a diameter of approximately 11/16 of an inch that contain a colored
15 liquid, and typically cannot withstand significant compression without breaking. When a player is hit with a paintball from an opponent's gun, the paintball ruptures and leaves a colored mark on the hit player who then must leave the game.

[0003] As the game of paintball has grown in sophistication, semi-automatic paintball guns, guns that sequentially fire paintballs as fast as the trigger can be
20 repeatedly pulled by the user, have become more prevalent. A high firing rate capacity of semi-automatic paintball guns results in the occasional rupture or breakage of paintballs which leave shell or capsule particles and filler paint deposits on the inside surface of a paintball gun barrel. If there are paint deposits on the gun barrel, the next ball will likely be crushed and broken upon its leaving the barrel. Such deposits negatively affect the
25 performance of the paintball gun.

[0004] The cleaning of the inside surface of the paintball gun barrel typically involves using a rod-like cleaning device such as disclosed in U.S. Design Pat. No. Des 393,115 issued Mar. 31, 1998 to Bell et al. One end of this device is provided with a

series of spaced apart, disc-like wiping elements such that it is inserted into the barrel of the paintball gun and pulled through to expel the build up of deposits inside the barrel. This type of cleaning process is not ideally effective during paintball competition because it pushes residual paint back into the gun breech, which is where the paintballs are
5 dropped into the barrel. Moreover, known cleaner designs come in varying lengths, which forces the player to buy two or more cleaners to properly fit the barrel length of their particular paintball guns.

In view of the foregoing, there is a need for improved techniques for remove residual paint deposits from paintball gun barrels; in particular, there is a need for an
10 approach that does not push paint into the gun's breech, and also efficiently accommodates various gun barrel lengths. Such a paintball barrel residual paint remover should be cost effective, highly portable, and very convenient to use.

BRIEF DESCRIPTION OF THE DRAWINGS

15 [0005] The present invention is illustrated by way of example, and not by way of limitation, in the figures of the accompanying drawings and in which like reference numerals refer to similar elements and in which:

Figure 1 illustrates the components used to build an embodiment of the present invention;

20 Figure 2 demonstrates a cross-sectional view of multiple embodiments of the present invention;

Figure 3 demonstrates a cross-sectional view of yet other embodiments of the present invention;

25 Figure 4 illustrates a cross-sectional view of a completed device according to an embodiment of the present invention;

Figure 5 illustrates a perspective view of the completed device according to an embodiment of the present invention;

Figure 6 illustrates various alternative embodiments of the present invention; and

Figure 7 illustrates additional alternative embodiments of the present invention.

5 The above referenced illustrations are not necessarily drawn to scale.

SUMMARY OF THE INVENTION

[0006] To achieve the forgoing and other objects and in accordance with the purpose of the invention, a technique to remove residual paint deposits from paintball gun barrels is described.

10 [0007] In one embodiment, a paint ball gun cleaning device for cleaning an inside barrel of a paint ball gun is set forth that comprises an outer tube having a first end and a second end where the diameter of the outer tube is configured to permit the outer tube to be inserted and removed along the length of the inside barrel of the paint ball gun. An inner tube having a first end and a second end, and sized appropriately, is inserted along
15 the length of the outer barrel. A compressible cleaning tip having a smaller diameter than the inside barrel is used in conjunction with a cleaning tip compression member which constrains the position of the compressible cleaning tip in the proximity of the first end of the outer tube, the cleaning tip compression member used to induce a compression state change in the first compressible cleaning tip when the inner tube is moved relative to the
20 outer tube, thereby selectively inducing the non-compressed state and the compressed state.

[0008] In another embodiment the above described device also includes a cleaning tip adaptor member that is joined with the inner tube on one end, and a second compressible cleaning tip for cleaning the inside barrel on the other end.

[0009] Other embodiments include a removable protective sleeve that substantially prevents harmful contact with the inside barrel and provides some degree of rigid support between the cleaning tip adaptor member and the second compressible cleaning tip.

[0010] In yet other embodiments of the present invention, the paint ball gun
5 cleaning device includes at least one flexible but sufficiently rigid section in its inner and outer tubes that permit the paint ball gun cleaning device to flexibly fold but otherwise be stiff enough to be pushed through the inside barrel when not folded.

[0011] In some embodiments, the paint ball gun cleaning device according to the present invention have an outer tube and inner tube that are made of a malleable material
10 that may be cut to an arbitrary length using common cutting tools.

[0012] A method to clean an inside barrel of a paint ball gun in accordance with the present invention is shown, which method includes the steps of inserting into the inside barrel a non-compressed compressible cleaning tip until ready to begin the cleaning process, whereby the compressible cleaning tip is compressed and retracted. While the
15 compressible cleaning tip is compressed and retracted it removes residual paint in the direction of the retraction and out of the gun barrel.

[0013] Other features, advantages, and object of the present invention will become more apparent and be more readily understood from the following detailed description, which should be read in conjunction with the accompanying drawings.

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DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0014] The present invention is best understood by reference to the detailed figures and description set forth herein.

5 [0015] Embodiments of the invention are discussed below with reference to the Figures. However, those skilled in the art will readily appreciate that the detailed description given herein with respect to these figures is for explanatory purposes as the invention extends beyond these limited embodiments.

[0016] Referring to Figure 1, the components to construct an embodiment of the
10 present invention are shown by way of example, where a brief description immediately follows, and detailed description is presented thereafter. In the Figure, an outer tube 100 and an inner tube 105 with an end section 107 are shown. These components form the main structure where the inner tube 105 is inserted inside of the outer tube 100, which structure receives on one end a cleaning tip 110 held in place by fastener 115, and
15 receives on the opposite end an adapter 120, with protective sleeve 130, and swab 140. Fastener 115 includes a wider end section herein referred to as fastener end 117. A lanyard 150 is available to removably secure the completed device to the user, while still being able to slide freely along outer tube 100.

[0017] A detailed description of a way to construct an embodiment of the present
20 follows. Figure 2 demonstrates the initial step, STEP A, of attaching cleaning tip 110 to inner tube 105 by way of fastener 115. In this example, cleaning tip 110 is configured to have a central hole sized to allow fastener 115 to be movably inserted through cleaning tip 110 and is long enough to penetrate through both cleaning tip 110 and into an end section of inner tube 105. Fastener 115 is fixed to inner tube 105 by known means, for
25 example, epoxy glue, or being screwed in. Outer tube 100 is then slid over inner tube 105 as shown in STEP B of the Figure. The paint cleaner assembly 200 of this intermediate construction represents a minimal configuration of the present invention for some embodiments as will be made clear in detail below. In short, outer tube 100 presses against the end of cleaning tip 110 opposite from fastener end 117. Fastener end 117, via

its attachment to inner tube 105, may be pulled in relative to outer tube 100 thereby providing a compression force onto cleaning tip 110. Hence, although it is anticipated that there are many known ways to configure fastener 115 and inner tube 105, some known practical considerations should be preferably met. For example, fastener 115 should preferably be joined to inner tube 105 with a bond that is sufficiently strong to withstand a high number of compression cycles on cleaning tip 110. Similarly, fastener 115 should preferably be strong enough to withstand a high number of compression cycles on cleaning tip 110.

[0018] It should be further understood that there are many known ways to actuate the compression of cleaning tip 110 in paint cleaner assembly 200 as described above. In alternative embodiments of the present invention, it is anticipated that depending on the particular application, a multiplicity of known attachments may be connected to end section 107 by known techniques thereby conveniently enabling a user to pull in fastener end 117 to compress cleaning tip 110. It is also anticipated that although it is shown that outer tube 100 and inner tube 105 have the same length, some embodiments may design inner tube 105 to extend beyond outer tube 100 (not shown) thereby permitting a user to pull directly on end section 107 without the need of additional attachments.

[0019] Although the operating principles of the present invention are described in detail below by way of an embodiment with an exemplar attachment to end section 107, conceptually paint cleaner assembly 200, according to the principles of the present invention, is designed small enough to be inserted into the barrel of paint ball gun without significantly making contact with the inner surface of the gun barrel until the user retracts inner tube 105 to compress cleaning tip 110, which expands against the inner surface of the gun barrel and effects the removal of residual surface paint as paint cleaner assembly 200 is retracted from the gun barrel.

[0020] Still referring to Figure 2, STEP C illustrates the making of an alternative embodiment of the present invention where an example of an attachment, adapter 120, and its assembly is shown, whereby a male end of adapter 120 is inserted into and fixed to end section 107, by being screwed in for example, as shown in STEP D of Figure 3. Adapter 120, as shown in the present embodiment, has an exposed end that is suitable to

receive a multiplicity of end attachments designed for the particular application, and serve the dual use of providing a gripping mechanism to actuate the compression of cleaning tip 110 during paint removal from paintball gun barrels. Adapter 120 may be constructed from any material that serves the described purpose, where, by way of
5 example, brass is a suitable choice for robust performance.

[0021] In another alternative embodiment, as shown in STEP E of Figure 3, protective sleeve 130 is placed to sufficiently cover adapter 120 thereby minimizing the risk of scratching the inside surface of the paintball gun barrel. Protective sleeve 130 is preferably made of soft plastic, such as vinyl for example, and held in place by friction so
10 that it can be easily removed when needed. Other known methods of providing a protective barrier as described may be employed. Lanyard 150 is an optional accessory that serves to secure the present invention to the user. In the embodiment shown, lanyard 150 has a detachable ring 155, which ring is placed around outer tube 100 and held from sliding off by adapter 120, or protective sleeve 130, or any attachment fixed to adapter
15 120. There are many lanyard designs known to those in the art, which designs may be implemented in some embodiments depending on the particular application.

[0022] Fixing attachment 140 to adapter 120 as shown in STEP F of Figure 3 completes the present embodiment. Many known techniques are available to secure attachment 140 to adapter 120, including, for example, by screwing a screw 145 into a
20 threaded female receiving end 125 formed in adapter 120 as shown in Figure 4 (a), thereby providing a completed paintball gun barrel cleaning device according to an embodiment of the present invention. In one embodiment of attachment 140, a shotgun swab is used; however, a multiplicity of known attachments is contemplated depending on the application.

25 [0023] To actuate the cleaning mechanism in the present embodiment the user simply pulls attachment 140 in the direction of the arrows shown in Figure 4 (b). When actuated, cleaning tip 110 is forced into its compressed state 400, thereby increasing its diameter perpendicular to the lengthwise axis of the outer tube 100.

[0024] To clean the inside barrel of a paint ball gun, the user of the present
30 embodiment would simply insert the present invention into the paintball gun barrel while

cleaning tip 110 is in the non-compressed as shown in Figure 4 (a). When the user has inserted cleaning tip 110 to the desired depth into the paintball gun barrel, attachment 140 is retracted in the direction of the arrows shown in Figure 4 (b) thereby expanding cleaning tip 110 into compressed state 400, which firmly presses against the inside surface of the paintball gun barrel. Continued retraction force keeps cleaning tip 110 in compressed state 400 and acting like a squeegee sweeping away paint in the direction of the retraction until cleaning tip 110 is pulled out of the paintball gun barrel and the residual paint deposits in the paintball gun barrel are removed. Figure 5 illustrates a perspective view of the embodiment of the present invention shown in Figure 4 (a).

[0025] Cleaning tip 110 is preferable made out of rubber to provide the desired compressibility and squeegee characteristics described; however, any suitable material known to those in the art may be used. Cleaning tip 110 is preferably sized to be very small to enter the barrel the paintball gun barrel without making substantial contact with the barrel, and yet be large enough to expand to the required diameter, as described above, when compressed. Attachment 140 may be configured as a secondary cleaner adapted to fit known paintball gun barrel cleaners including, for example, any gauge of cotton, cloths, or brushes as shown in Figure 6 (a). The optional secondary cleaners further insuring a clean and dry paintball gun barrel. In some embodiments, the application may require various sizes of swab 620, and in yet other applications, an alternative flag tip 630 that can hold flags or cotton may be desired.

[0026] When outer tube 100 and inner tube 105 are made from sufficiently soft and malleable plastic, an attendant capability of the present invention is to enable the user to cut, using common cutting tools, outer tube 100 and inner tube 105 to a desired length for a particular paintball gun barrel application. Those in the art will appreciate that the user may readily determine the optimal length required for their particular application.

[0027] Yet another alternative embodiment of the present invention is shown in Figure 6 (b) where a section 600 of the relatively rigid shafts of outer tube 100 and inner tube 105 is removed and replaced with relatively flexible materials that permit folding as shown in Figure 6 (c). For example, section 600 of outer tube 100 is be replaced with flexible surgical tubing and joined to the remaining rigid sections of outer tube 100 by

known means, and section 600 inner tube 105 is replaced with a monofilament line joined to the remaining rigid sections of inner tube 105 by known means. Thus, a foldable embodiment of the present invention is achieved, while maintaining all the attendant characteristics and functionality as previously described.

5 [0028] Yet other embodiments according to the present invention are anticipated where the cleaning tip 110 takes on a multiplicity of various forms that achieve the same function and operate according to the principals of the present invention. For example, referring to Figure 7 (a), cleaning tip 110 may be replaced with at least one cleaning disc(s) 710 or a balloon, globe like shape 720, depending on the application. Cleaning
10 disc(s) 710, in accordance with the principles of the present invention, perform a similar function as cleaning tip 110, but operate in a somewhat different manner. That is, to clean a gun barrel, the user would first insert cleaning disc(s) 710 into the barrel while in their non-vertical substantially parallel position as shown in the Figure. Each disc can pivot with respect to the axis when inserted into the paintball gun thereby not pushing
15 paint into the breach. Then, in a similar manner as described for cleaning tip 110, the user retracts inner tube 105, thereby pressing outer tube 100 against cleaning disc(s) 710 and forcing it into the vertical position, which results in firm contact between the out edge of cleaning disc(s) 710 and the inside gun barrel. Thus, when cleaning disc(s) 710 gets to the breach upon outward force the discs are then forced to stand in a perpendicular
20 axis and thus causing a tight seal and expelling paint upon the users outward pull. As described for cleaning tip 110, the cleaning disc(s) 710 in the vertical position act as a squeegee sweeping away paint in the direction of the retraction until cleaning disc(s) 710 is pulled out of the paintball gun barrel and the residual paint deposits in the paintball gun barrel are removed.

25 [0029] In addition, some embodiments may not have protective sleeve 130 as shown in Figure 7 (b). Yet other alternative embodiments may remove swab 620 and replace it with a handgrip attachment 730 (a t-bar handle is shown by way of example) that is used to pull in inner tube 105 thereby compressing cleaning tip 110.

[0030] Having fully described at least one embodiment of the present invention,
30 other equivalent or alternative methods of implementing a paintball gun barrel cleaner

according to the present invention will be apparent to those skilled in the art. The invention has been described above by way of illustration, and the specific embodiments disclosed are not intended to limit the invention to the particular forms disclosed. The invention is thus to cover all modifications, equivalents, and alternatives falling within

5 the spirit and scope of the following claims.